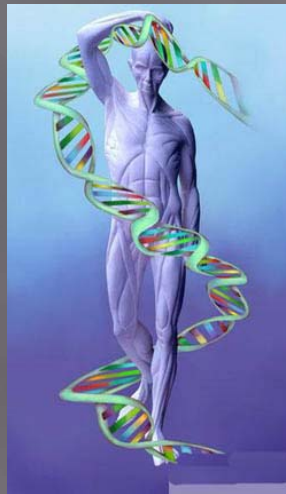


MSA FACILITIES SAFETY AND HEALTH INSPECTION PROGRAM

Ergonomic Considerations



Approved for Public Release;
Further Dissemination Unlimited

Ergonomic Considerations

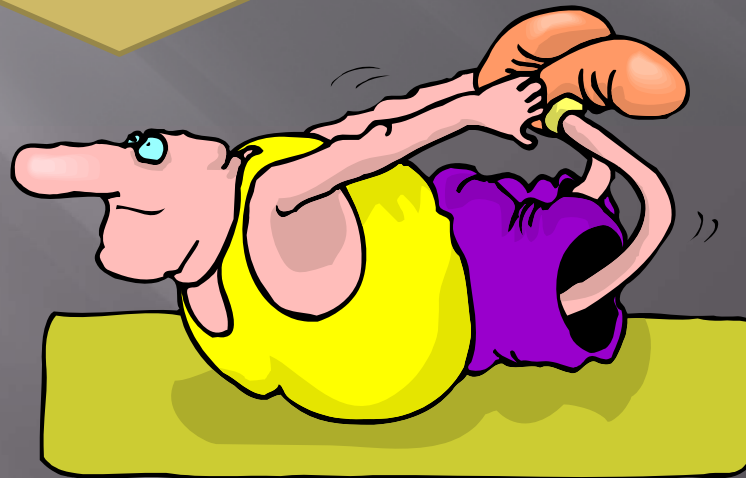
At the completion of this unit you shall be able to:

1. Utilize section C of the Safety and Health Hazard Inspection Program Checklist to identify compliant and non-compliant safety behaviors.
2. Identify areas of concern requiring immediate action to.

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this presentation!

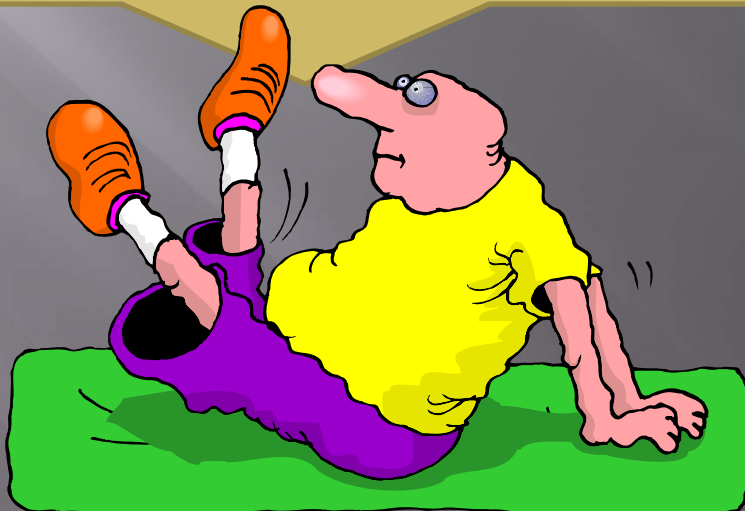
Ergonomic Considerations

Ergonomics is the science of fitting workplace conditions and job demands to the capabilities of the working population. Effective and successful "fits" assure high productivity, avoidance of illness and injury risks, and increased satisfaction among the workforce. Although the scope of ergonomics is much broader, the term here refers to assessing those work-related factors that may pose a risk of musculoskeletal disorders and recommendations to alleviate them.



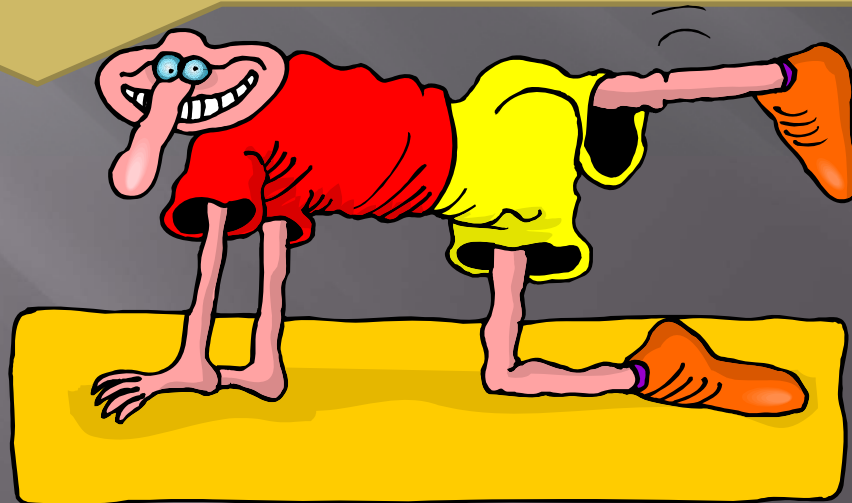
Ergonomic Considerations

Common examples of ergonomic risk factors are found in jobs requiring repetitive, forceful, or prolonged exertions of the hands; frequent or heavy lifting, pushing, pulling, or carrying of heavy objects; and prolonged awkward postures. Vibration and cold may add risk to these work conditions. Jobs or working conditions presenting multiple risk factors will have a higher probability of causing a musculoskeletal problem.



Ergonomic Considerations

The level of risk depends on the intensity, frequency, and duration of the exposure to these conditions and the individuals' capacity to meet the force of other job demands that might be involved.



Ergonomic Considerations

- This training will discuss the issue of ergonomics in facility operations.

MSA GENERAL INDUSTRY-BASED SAFETY AND HEALTH
HAZARD INSPECTION CHECKLIST

No.	Inspection Observations	Compliant? Y•N•N/A	See Comments (indicate with X)
3	Work space appears to be stable and organized.		
4	Workers are focusing on task at hand to perform work safely.		
5	Workers appear to be familiar with task and working within their individual capabilities.		
6	Employees are adhering to messages posted on signs, signals, markings, and barricades.		
7	Employees are observed following safe lifting and manual handling work practices.		
8	Employees are using mechanical lifting devices for heavy or repetitive lifting tasks.		
9	Machinery observed in use is being operated safely.		
10	Portable Power tools observed in use are being operated safely.		
11	Proper PPE for welding, cutting, and brazing is used correctly.		
12	Welding, cutting and brazing equipment observed in use is being operated safely.		
13	Personnel driving vehicles in parking lots and nearby roads are doing so in a safe and attentive manner (not speeding, attentive to pedestrians, etc.)		
14	Employees using stairways are observed ascending/descending safely, using handrails provided.		
15	Employees are selecting portable ladders of proper type and size for the work being performed.		
16	Powered Manlift/Aerial Lift platforms in use are being operated safely.		
17	Hazardous materials observed in use are being safely handled.		
18	Other.		
C ERGONOMIC CONSIDERATIONS			
1	Working postures are ergonomically sound and correct.		
2	Chairs are designed to properly support the user.		
3	Keyboard or input device are designed or arranged to ensure the hands and wrists are able to perform their tasks safely.		
4	The monitor(s) are positioned in a manner that the user is able to use them without having to bend their head or neck.		
5	Work station design is ergonomically designed to minimize employee injury.		
6	Other.		
D OFFICE FIXTURES AND FURNITURE			
1	Chair visual inspections are complete and any chairs with deficiencies are pulled from service.		
2	Drawers of files and desks closed when not attended.		
3	File cabinets, storage cabinets, desk organizers, and bookshelves stable or anchored.		

Ergonomic Considerations

- ▣ This is documented in section C of the Safety and Health Hazard Inspection Program checklist.

MSA GENERAL INDUSTRY-BASED SAFETY AND HEALTH
HAZARD INSPECTION CHECKLIST

No.	Inspection Observations	Compliant? Y•N•N/A	See Comments (indicate with X)
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1	Chair visual inspections are complete and any chairs with deficiencies are pulled from service.		
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Ergonomic Considerations

1. Working postures are ergonomically sound and correct.
2. Chairs are designed to properly support the user.
3. Keyboard or Input device are designed or arranged to ensure the hands and wrists are able to perform their tasks safely.
4. The monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.
5. Work station design is ergonomically designed to minimize employee injury.
6. Other

Ergonomic Considerations

1. Working postures are ergonomically sound and correct.

To understand the best way to set up a computer workstation, it is helpful to understand the concept of neutral body positioning. This is a comfortable working posture in which your joints are naturally aligned. Working with the body in a neutral position reduces stress and strain on the muscles, tendons, and skeletal system and reduces your risk of developing a musculoskeletal disorder (MSD).



Ergonomic Considerations

1. Working postures are ergonomically sound and correct.

The following are important considerations when attempting to maintain neutral body postures while working at the computer workstation: Hands, wrists, and forearms are straight, in-line and roughly parallel to the floor.

- ▣ Head is level, or bent slightly forward, forward facing, and balanced. Generally it is in-line with the torso.
- ▣ Shoulders are relaxed and upper arms hang normally at the side of the body.



Ergonomic Considerations

1. Working postures are ergonomically sound and correct.

- ▣ Elbows stay in close to the body and are bent between 90 and 120 degrees.
- ▣ Feet are fully supported by the floor or a footrest may be used if the desk height is not adjustable.
- ▣ Back is fully supported with appropriate lumbar support when sitting vertical or leaning back slightly.
- ▣ Thighs and hips are supported by a well-padded seat and generally parallel to the floor.
- ▣ Knees are about the same height as the hips with the feet slightly forward.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ A chair that is well-designed and appropriately adjusted is an essential element of a safe and productive computer workstation. A good chair provides necessary support to the back, legs, buttocks, and arms, while reducing exposures to awkward postures, contact stress, and forceful exertions.

Increased adjustability ensures a better fit for the user, provides adequate support in a variety of sitting postures, and allows variability of sitting positions throughout the workday. This is particularly important if the chair has multiple users.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ The following parts of the chair are important elements to consider in creating a safe and productive workstation:

- Backrest
- Seat
- Armrest
- Base



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ Poor back support and inappropriate postures may result from inadequate backrest size, material, positioning, or use. Working in these postures may lead to back pain and fatigue. For example, a chair without a suitable or adjustable backrest will not provide adequate lumbar support or help maintain the natural S-shape curvature of the spine.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ Using a chair with a seat that is too high may force you to work with your feet unsupported or encourage you to move forward in the chair to a point where your back is unsupported making it more difficult to maintain the S-shape of the spine. These awkward postures can lead to fatigue, restricted circulation, swelling, numbness, and pain.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ An inappropriately sized seat pan can be uncomfortable, provide inadequate support to the legs, and restrict movement. One that is too short can place excess pressure on the buttocks of taller users, one that is too long can place excess pressure on the knee area of shorter users and minimize back support. One that is too small can restrict movement and provide inadequate support. Prolonged use can restrict blood flow to the legs and create irritation and pain.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ Armrests that are not adjustable, or those that have not been properly adjusted, may expose you to awkward postures or fail to provide adequate support. For example armrests that are:
 - Too low may cause you to lean over to the side to rest one forearm. This can result in uneven and awkward postures, fatiguing the neck, shoulders, and back.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- Too high may cause you to maintain raised shoulders, which can result in muscle tension and fatigue in the neck and shoulders.
- Too wide cause you to reach with the elbow and bend forward for support. Reaching pulls the arm from the body and can result in muscle fatigue in the shoulders and neck.
- Too close can restrict movement in and out of the chair.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- Too large or inappropriately placed may interfere with the positioning of the chair. If the chair cannot be placed close enough to the keyboard, you may need to reach and lean forward in your chair. This can fatigue and strain the lower back, arm, and shoulder.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ Armrests that are made of hard materials or that have sharp corners can irritate the nerves and blood vessels located in the forearm. This irritation can create pain or tingling in the fingers, hand, and arm.



Ergonomic Considerations

2. Chairs are designed to properly support the user.

- ▣ Chairs with four or fewer legs may provide inadequate support and are prone to tipping.
- ▣ Inappropriate choice of casters, or a chair without casters, can make positioning the chair in relation to the desk difficult. This increases reaching and bending to access computer components, which can lead to muscle strain, and fatigue.



Ergonomic Considerations

3. Keyboard or Input device are designed or arranged to ensure the hands and wrists are able to perform their tasks safely.

- ▣ Proper selection and arrangement of the computer keyboard helps reduce exposure to awkward postures, repetition, and contact stress.

Consider the following factors when evaluating your computer workstation.

- Keyboard Placement – Height
- Keyboard Placement – Distance
- Design and Use
- Left Hand Key Usage



Ergonomic Considerations

3. Keyboard or Input device are designed or arranged to ensure the hands and wrists are able to perform their tasks safely.

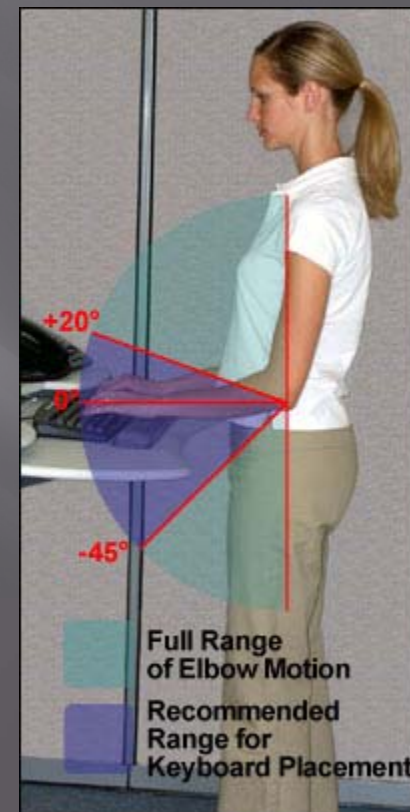
- ▣ You should observe the keyboard and consider its placement in conjunction with other components of the computer workstation, including the mouse and wrist rests.



Ergonomic Considerations

3. Keyboard or Input device are designed or arranged to ensure the hands and wrists are able to perform their tasks safely.

- ▣ Keyboards, pointing devices, or working surfaces that are too high or too low can lead to awkward wrist, arm, and shoulder postures. For example, when keyboards are too low you may type with your wrists bent up, and when keyboards are too high, you may need to raise your shoulders to elevate your arms. Performing keying tasks in awkward postures such as these can result in hand, wrist, and shoulder discomfort.



Ergonomic Considerations

3. Keyboard or Input device are designed or arranged to ensure the hands and wrists are able to perform their tasks safely.

- ▣ A keyboard or mouse/pointer that is too close or too far away may cause you to assume awkward postures such as reaching with the arms, leaning forward with the torso (A), and extreme elbow angles (B). These awkward postures may lead to musculoskeletal disorders of the elbows, shoulders, hands, and wrists.

(A)



(B)



Ergonomic Considerations

3. Keyboard or Input device are designed or arranged to ensure the hands and wrists are able to perform their tasks safely.

- ▣ A traditional keyboard may cause you to bend your wrists sideways to reach all the keys. Keyboard tilt, caused by extending the legs on the back of the keyboard or by a steep design angle, may cause the wrist to bend upward. Smaller keyboards, such as those found on laptops, may also contribute to stressful postures. These awkward wrist postures can create contact stress to the tendon sheath and tendons that must move within the wrist during repetitive keying.



Ergonomic Considerations

4. The Monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.

- ▣ Choosing a suitable monitor and placing it in an appropriate position helps reduce exposure to forceful, awkward postures, and overhead glare. This helps prevent possible health effects such as excessive fatigue, eye strain, and neck and back pain.



Ergonomic Considerations

4. The Monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.

- ▣ Consider the following issues when evaluating computer workstations:
 - Viewing distance
 - Viewing Angle-Height and Side to Side
 - Viewing time
 - Viewing Clarity



Ergonomic Considerations

4. The Monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.
 - ▣ Monitors placed too close or too far away may cause you to assume awkward body positions that may lead to eyestrain.
 - ▣ Viewing distances that are too long can cause you to lean forward and strain to see small text. This can fatigue the eyes and place stress on the torso because the backrest is no longer providing support.



Ergonomic Considerations

4. The Monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.

- Viewing distances that are too short may cause your eyes to work harder to focus (convergence problems) and may require you to sit in awkward postures. For instance, you may tilt your head backward or push your chair away from the screen, causing you to type with outstretched arms.



Ergonomic Considerations

4. The Monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.

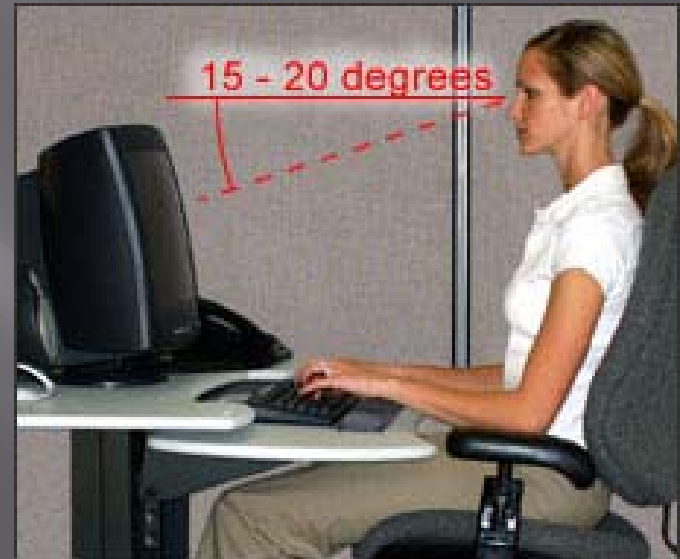
- ▣ Working with your head and neck turned to the side for a prolonged period loads neck muscles unevenly and increases fatigue and pain.



Ergonomic Considerations

4. The Monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.

- ▣ The top of the monitor should be at or slightly below eye level. The center of the computer monitor should normally be located 15 to 20 degrees below horizontal eye level



Ergonomic Considerations

4. The Monitor(s) are positioned in a manner that the user is able use them without having to bend their head or neck.

- ▣ Monitors that are tilted significantly either toward or away from the operator may distort objects on the screen, making them difficult to read. Also, when the monitor is tilted back, overhead lights may create glare on the screen. This can result in eyestrain and sitting in awkward postures to avoid eye glare.



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

- ▣ This item deals with how the workstation is aligned to the worker. Much of what we've talked about so far deals with computer work stations but much of what we do falls outside of the computer related work.
- ▣ This means we need to address other work situations/stations as well.



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

- ▣ Besides computer station work we also do work handling materials, troubleshooting equipment, and fabricating components.
- ▣ Each of these have a number of unique issues that need to be dealt with to help reduce soft tissue injuries.



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

Our employees face ergonomic issues when transporting supplies and equipment around shops, storage areas, and worksites. This section discusses potential hazards and identifies possible solutions involved in the following tasks:

- Heavy Lifting
- Pushing, Pulling and Carrying
- Staging and Housekeeping
- Vehicular Activities



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

- ▣ Lifting heavy items is one of the leading causes of injury in the workplace. In 2001, the Bureau of Labor Statistics reported that over 36 percent of injuries involving missed workdays were the result of shoulder and back injuries. Overexertion and cumulative trauma were the biggest factors in these injuries.

When employees use smart lifting practices and work in their “power zone,” they are less likely to suffer from back sprains, muscle pulls, wrist injuries, elbow injuries, spinal injuries, and other injuries caused by lifting heavy objects.

• Heavy Lifting



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

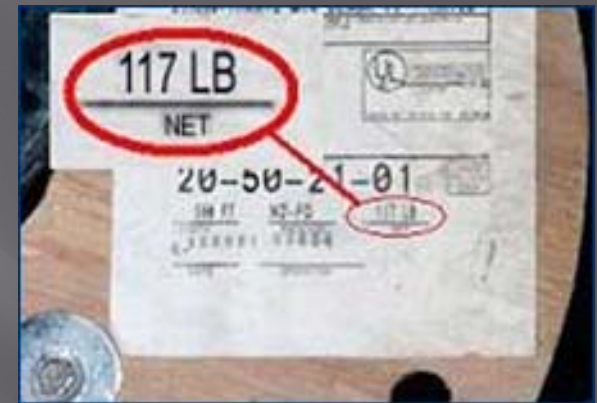
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When employees use smart lifting practices and work in their “power zone,” they are less likely to suffer from back sprains, muscle pulls, wrist injuries, elbow injuries, spinal injuries, and other injuries caused by lifting heavy objects.

- ▣ Weight of Objects

• Heavy Lifting



Generally, lifting >50# can result in a back injury.

Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

- ▣ Lifting heavy items is one of the leading causes of injury in the workplace. In 2001, the Bureau of Labor Statistics reported that over 36 percent of injuries involving missed workdays were the result of shoulder and back injuries. Overexertion and cumulative trauma were the biggest factors in these injuries.

When employees use smart lifting practices and work in their “power zone,” they are less likely to suffer from back sprains, muscle pulls, wrist injuries, elbow injuries, spinal injuries, and other injuries caused by lifting heavy objects.

- ▣ Weight of Objects
- ▣ Awkward Postures

• Heavy Lifting



Twisting, over reaching, working above your shoulders can all cause an injury.

Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

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When employees use smart lifting practices and work in their “power zone,” they are less likely to suffer from back sprains, muscle pulls, wrist injuries, elbow injuries, spinal injuries, and other injuries caused by lifting heavy objects.

- ▣ Weight of Objects
- ▣ Awkward Postures
- ▣ High-Frequency and Long-duration Lifting

• Heavy Lifting



Repeated motions or long term holding of even “light” objects can result in injury.

Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

- ▣ Lifting heavy items is one of the leading causes of injury in the workplace. In 2001, the Bureau of Labor Statistics reported that over 36 percent of injuries involving missed workdays were the result of shoulder and back injuries. Overexertion and cumulative trauma were the biggest factors in these injuries.

When employees use smart lifting practices and work in their “power zone,” they are less likely to suffer from back sprains, muscle pulls, wrist injuries, elbow injuries, spinal injuries, and other injuries caused by lifting heavy objects.

- ▣ Weight of Objects
- ▣ Awkward Postures
- ▣ High-Frequency and Long-duration Lifting
- ▣ Inadequate Handholds

• Heavy Lifting



Inadequate handholds make lifting more difficult, move the load away from the body, lower lift heights, and increase the risk of contact stress and of dropping the load.

Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

- ▣ Lifting heavy items is one of the leading causes of injury in the workplace. In 2001, the Bureau of Labor Statistics reported that over 36 percent of injuries involving missed workdays were the result of shoulder and back injuries. Overexertion and cumulative trauma were the biggest factors in these injuries.

When employees use smart lifting practices and work in their “power zone,” they are less likely to suffer from back sprains, muscle pulls, wrist injuries, elbow injuries, spinal injuries, and other injuries caused by lifting heavy objects.

- ▣ Weight of Objects
- ▣ Awkward Postures
- ▣ High-Frequency and Long-duration Lifting
- ▣ Inadequate Handholds
- ▣ Environmental Factors

• Heavy Lifting



Lighting, Temperature, walking surfaces, can all affect the potential of a back injury.

Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

Our employees face ergonomic issues when transporting supplies and equipment around shops, storage areas, and worksites. This section discusses potential hazards and identifies possible solutions involved in the following tasks:

- Heavy Lifting
- Pushing, Pulling and Carrying
- Staging and Housekeeping
- Vehicular Activities



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

•Pushing, Pulling and Carrying

- ▣ Much of our work involves moving materials around the worksite. Commonly, there is a central staging area from where supplies are distributed to separate work areas. This can involve pushing, pulling, and lifting materials, sometimes with the help of a hand truck or utility cart.



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

• Staging and Housekeeping

Everybody benefits when employers encourage proper staging and housekeeping practices; productivity rises, quality improves, profits increase, and the risk of injury is reduced.

Employees can spend less time moving materials and more time performing skilled tasks.



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

- ▣ We often use vans or trucks to transport tools and supplies. Employees may have to reach over or climb into the small, awkward areas of these automobiles.

Some of the tasks of transporting and retrieving supplies and tools from vehicles that cause an ergonomic issue are:

Vehicular Activities



Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

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Some of the tasks of transporting and retrieving supplies and tools from vehicles that cause an ergonomic issue are:

- ▣ Reaching into a Vehicle

Vehicular Activities



Crouching or kneeling to reach into the back of a van or a truck with a shell might put contact stress on the knees and stress on the lower back.

Ergonomic Considerations

5. Work station design is ergonomically designed to minimize employee injury.

– Material Handling

- ▣ We often use vans or trucks to transport tools and supplies. Employees may have to reach over or climb into the small, awkward areas of these automobiles.

Some of the tasks of transporting and retrieving supplies and tools from vehicles that cause an ergonomic issue are:

- ▣ Reaching into a Vehicle
- ▣ Loading and Unloading

Vehicular Activities



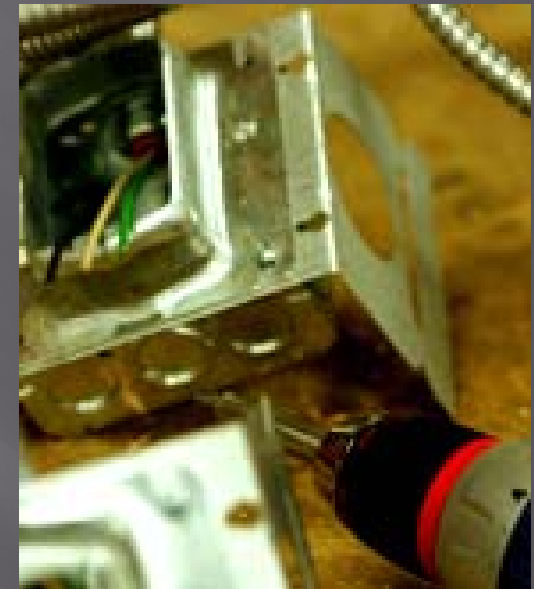
- ▣ Lifting and lowering materials and equipment from the back of vehicles may place strain on the back.
- ▣ Lifting toolboxes, supplies, or other materials over the sides of the truck stresses the shoulders and back.

Ergonomic Considerations

– Installation and Repair

Installation and repair tasks performed around the worksite can be demanding. Employees often dig trenches or pull long runs of heavy gauge wire. These tasks may require working in awkward postures since much of the work is done at ceiling height, close to the floor, or in cramped service areas. Working in these postures increases the amount of force employees must exert to perform these tasks.

Employees may assume awkward postures while using hand tools such as pliers, crimpers, and side cutters for installation and repair tasks. This may create tension and contact stress to the tendons and nerves of the hands and lower arms. All of these potential situations may result in musculoskeletal problems if employees are not aware of the risk and do not take precautions to minimize hazards.



Ergonomic Considerations

– Shop Work

Some times our tasks take place in shops. Often this serves as a way to increase productivity, improve quality, reduce waste, and save time. There are also a number of ergonomic benefits to shop work, such as controlling work heights, supporting tool weights, and controlling environmental conditions.



Ergonomic Considerations

– Shop Work

While some ergonomics-related risk factors can be controlled through shop work, it may create other job-specific hazards including heavy manual lifting, repetitive movements, awkward or static postures and contact stress. Employees should be aware of the potential hazards that are unique to a shop setting.



Ergonomic Considerations

- If at any time you have any questions about how to fill out the form or about the items on the form please contact project safety group.

MSA GENERAL INDUSTRY-BASED SAFETY AND HEALTH HAZARD INSPECTION CHECKLIST

Facility:		Facility Representative:	
Date:		Team Member:	
Total Items Reviewed:		Team Member:	
Total Non-Compliant Items:		Team Member:	

No.	Inspection Observations	Compliant? Y•N•N/A	See Comments (indicate with X)
A	FIRE PROTECTION INSPECTION <i>(All issues must be observed as applicable see note 2)</i>		
1	Emergency Lights - Each unit must be operable when tested.		
2	Portable Fire Extinguishers (PFE) - Each unit is properly mounted, an inspection tag is in place and reflects through previous month, the pressure gauge is in the "green" zone (where applicable).		
3	PFE is not obstructed, is visible, and the seal is not broken.		
4	Sprinkler Clearance - Clearance between the sprinkler deflector and the top of any storage is 18 inches or greater.		
5	Fire Riser Pressure Gauge Inspection - Inspect gauges to verify pressure to the building and pressure held in the fire system. Typically both gauges will have similar pressure readings.		
6	Fire Risers - Access to fire system sprinkler risers and other system components must be unobstructed.		
7	Fire Riser Valve Inspection - Check all seals, position and supervision for broken seals or possible tampering.		
8	Post Indicating Valve Inspection - This valve will be located outside of the facility. It must be verified that the window on the side of the valve reads "OPEN".		
9	Exit Signs - Exit signs with an internal lighting source must be checked to ensure all lamps are functional. - Exit signs that use Tritium must be observed that they have not been damaged, all applicable labels are present, the sign has not expired, and it is not covered with another sign.		
10	Fire Doors - Identify that fire doors operate freely and latch securely upon closure. Fire doors must not be propped open.		
11	Ceiling Tiles - Where automatic sprinklers are installed drop ceiling tiles are in place. Missing tiles slow response of fire suppression sprinklers.		
12	Manual alarm stations are easily identified and readily accessible.		
13	Other.		
B	GENERAL SAFE BEHAVIORS		
1	Employees are taking the necessary safety precautions for the work being performed.		
2	Work is being performed such that collocated employees in the area are not exposed to occupational hazards or unsafe conditions.		

Ergonomic Considerations

Thank you for your time
and desire to help us have
a safer workplace